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INCREASING TERRITORIAL CAPITALIZATION BY INCORPORATION OF SMALL ENTERPRISES INTO CLUSTERS

Modernization of the Russian national economy depends on small businesses and their involvement in capitalization of the territorial potential. This article discusses methods, models, and mechanisms of territorial capitalization based on incorporation of small business enterprises into clusters along with medium- and large businesses. We propose an optimization model for assessing the efficiency of such clusters: our research has shown that this model can be applied for decision-making in regional strategic planning. Methodologically, this study relies on the theories of industrial development and economic growth, the industrial cluster theory, and the works of Russian and international researchers on mechanisms of management of territorial potential, their establishment and implementation. Capitalization of the region's resource potential manifests itself in the form of static and dynamic effects. We developed models of interaction between small and other businesses and structures within a cluster oriented towards territorial capitalization. We demonstrated that incorporation of a university into a cluster structure increases the innovative capacity of all cluster members. This research may be further expanded to study the mechanisms of involving small businesses operating in peripheral areas into clusters.

Keywords: territorial potential, incorporation, small business, innovative development, regional cluster, business integration, capitalization, cluster modelling

Introduction

In the second decade of the twenty-first century, one of the major imperatives of the state economic management in Russia has become to stimulate and facilitate the country's transition to a non-resource-based model of industrial development. This priority is determined by the increasing challenges faced by Russia in the international economic arena, since this country proved to be more susceptible to changes in commodity markets than the leading actors. Furthermore, in the recent years Russia has been vulnerable to the macroeconomic impacts of lower oil prices. Thus, the country's predominantly resource-based economy and the influence of world prices on the domestic market can serve as major impediments to its sustainable growth in the future. In these conditions the strategy of modernization of the Russian economy, in particular its real sector, should involve accelerated growth of manufacturing and processing industries. This growth should be based on enhancing innovation to ensure sustainable development of regional and industry-specific segments. Thus, the focus of the government's attention is shifting to providing real support to small innovative industrial enterprises, especially those that are capable of integrating with large businesses with *a priori* high modernization potential. The state policy is targeted at balanced industrial modernization of the country and falls in line with the internationally established practice of stimulating innovative entrepreneurship of small industrial enterprises.

In the recent decades, small business has been incorporated into all spheres of production, service and research and therefore has become vital for the country's economy. Small enterprises perform a range of important social and economic functions: they create workplaces, provide competitive environment, expand the taxable base of the budget, maintain social stability, manufacture import-substituting products, and so on. Unfortunately, the majority of small industrial enterprises in Russia fail to demonstrate a sufficient level of innovative performance. Thus, it is crucial to develop new technologies and forms of interaction between small and large business in order to improve the innovative and competitive edge of the Russian economy. Therefore, it is particularly important to study the opportunities of involving small business into regional clusters and to develop tools for assessing the efficiency of such clusters.

Theoretical framework

The term '*capitalization*' is widely used in economic research literature, and it usually tends to be associated with such concepts as 'value' and 'evaluation'. We believe, however, that such interpretation of this category is too narrow since Karl Marx defined capital *as value in motion*, referring to the process in which value increases and changes its forms [1].

Analyzing the meaning of the concept '*capitalization*' in the modern research literature, we can point out the two main approaches: capitalization can be seen as a phenomenon and as a process [2, 3, 4]. For example, Y.V.Rozhkov and I.P.Chernaya point out that capitalization can be defined as the involvement of new resources into the capital turnover or can be associated with seeing the cost expression of capital as an ever changing characteristic [5]. It has also been shown that these processes do not just follow their natural course but are regulated by specific institutional mechanisms, which provide efficient self-regulation of market processes [6, 7]. Although we fully support this opinion, it should be added that the most important role for capitalization of the territorial potential is played by those institutional mechanisms that facilitate efficient cooperation between local businesses operating within projects of innovative development. Therefore, we believe it is crucial, when considering the role of small business in territorial capitalization, that we should take a closer look at the management of this process.

In the light of the above, we propose the following definition of territorial potential as *a complex of multi-level institutional processes and managerial measures to facilitate involvement of small businesses into regional modernization and to promote innovation-driven entrepreneurship*.

As international and Russian experience has shown, the most efficient involvement of small business in modernization can be achieved through cluster projects. The basic premise for regarding the possibility of resource capitalization within clusters can be found in works by Alfred Marshall, who believed that the advantages commanded by large enterprises can become accessible to small businesses, if they are located in industrial regions, since these regions are characterized by a larger supply of workforce, greater availability of suppliers and intermediaries specializing on a particular industry and better access to new technologies and expertise [8]. Methodologically, the research of resource capitalization relies on the works of François Perroux, who introduced the theory of growth poles, referring to the concentration of technically advanced industries that stimulated economic development in linked businesses and industries [9].

The cluster incorporates small and large businesses sharing one infrastructure. Thus, the cluster integrates the economic potential of its members and produces a synergy in territorial capitalization by contributing to faster diffusion of expertise, technologies and professional competencies. This means that the region's economic resources can be converted into innovative products and services, which enhances the region's competitiveness. Thus, the economy of scale is created, which can have a static as well as dynamic effect. The static effect is primarily related to more efficient and rational use of regional resources while the dynamic effect, to cutting costs and increasing the cumulative output. The dynamic effect is based on establishment of network cooperation with suppliers and consumers and creating internal technological networks, that is, it is mostly created through efficient exchange of market knowledge and technologies, improvement of the investment climate and development of the human capital.

Thus, our hypothesis is that small business can be incorporated in the processes of territorial capitalization if small and large businesses are integrated into clusters.

Methods and technologies of involvement of small business in innovative processes of regional development

We analysed the factors and conditions stimulating integration of businesses of different scale and found that the existing institutional environment in Russian regions is not conducive to active development of innovation. In the recent years, however, it has become increasingly clear that integration of growth-oriented small, medium and large businesses will enable them to overcome their resource constraints to modernize and realize innovative projects. Thus, the focus of modern research has shifted from analysis of free competition to search for mechanisms for facilitation of inter-enterprise cooperation.

The key arguments for clusterization include the following:

- this way cluster members mutually enhance their resource potential (there can be one or multiple kinds of resources) to realize projects that would otherwise remain inaccessible for individual businesses (especially small ones);
- clusters provide enterprises with access to qualified and efficient human resources;
- clusters facilitate information flows by creating collaborative networks for transfer and exchange of market-related and technological information, knowledge and experience;
- clusters enable enterprises expand their knowledge base and make access to it better organized and cost-effective;
- joining a cluster tends to improve the companies' resource management, firstly, by making the supply of raw materials and component parts more efficient; secondly, by increasing the availability and quality of specialized service; and thirdly, by significantly cutting transaction costs (through using transfer (or internal) prices between the cluster members);
- clusters make financial resources more accessible for their members (for instance, risk financing for new technological companies in an IT cluster);
- clusters increase the R&D capacities of enterprises.

Nowadays cluster technologies are seen as a key tool for implementation of strategies for social and economic development in the majority of countries. As international practice shows, cluster development makes the regional economy more competitive. For example, in Scandinavian countries, Italy and Slovenia, the state actively supported cluster initiatives and thus encouraged innovation and integration of economies of backward territories in the system of international economic relations.

Most of the world's leading economies stimulate cluster development: in the EU alone there are over 2,000 clusters, which produce over 60% of the GDP. Clusterization processes run particularly intensively in the manufacturing industry: car manufacturing, biotechnological sphere, consumer goods industry, electronics, mechanical engineering, and construction.

In Russia, cluster policy started to develop in 2008, when the government adopted the 'Concept of Long-Term Social and Economic Development of the Russian Federation Until 2020'. Volga and Central federal districts are centres of clusterization, with 28 and 16 successful clusters respectively. In total, according to the Ministry of Economic Development, Russia now has 73 clusters. The Ministry for Economic Development of Russia has launched a priority project 'Development of Investment Attractive Innovative World-Class Clusters'. Within the framework of this project, in October 2016 the Ministry selected eleven clusters from eleven regions of Russia which will be entitled to the support of the Ministry and other organizations and institutions. These clusters are expected to 'outperform the growth rates, achieve the world level of investment attractiveness, develop the mechanisms of support for entrepreneurship and find optimal placement in the global value added chain' ¹.

The process of incorporating small enterprises into clusters will bring the following benefits for the economy of the region:

- structural and systemic enhancement of interactions between companies, scientific, governmental and financial organizations.
- ensuring optimal allocation of resources to improve the balance of economic reproduction processes;
- increasing sustainability of the regional economy by reducing the risks faced by cluster members.

Thus, the territorial potential is developed through diffusion of innovations; efficient redistribution of the capital inside the region; growth of tax revenues; commercialization of research results; establishment of mutually beneficial relations between cluster members; enhancement of the trade balance in the territory; and stimulation of structural changes in the economy of the region.

It should be noted that small businesses not only increase the GRP of the region but also help to reallocate resources from less efficient to more efficient spheres. This means that the development of innovative industries will not require any additional budget funding.

Meanwhile, Russia's rates of integration of small and large business are comparatively low by world standards. Partially this is due to the fact that even though certain elements of cluster support infrastructure demonstrate high levels of performance, this infrastructure is generally oriented towards providing

¹ Source: Official web-site of the Ministry for Economic Development of the Russian Federation. Retrieved from <http://economy.gov.ru/minec/about/structure/depino/2016191004>

informational and analytical support rather than funding. Therefore, for financial support cluster initiatives mostly rely on commercial and investment banks, venture companies and development institutions.

Recently, leasing financing has started to play an increasingly important role in projects for modernization of small business. In many regions, leasing companies are actively involved in funding innovative cluster projects. For example, in Kaluga region, 'MSP Leasing' company funds modernization of automotive components production 'Optima' in an industrial cluster.² In St.Petersburg, the regional leasing company 'XXI Vek' operates as a part of the non-profit partnership 'Cluster of Medical and Ecological Instrument Engineering and Biotechnologies'.³ The Southern Federal District also has a vast experience of using 'innovating leasing' to develop cluster initiatives: at the moment, there are 110 leasing companies operating on this territory.

Thus, clusters are now becoming a model of modernization of the non-resource-based sector of the Russian industry. It is also obvious that small innovative enterprises should become an essential part of cluster structures along with large businesses as the cluster core. Small innovative business can play the role of a technological subsystem, for example, specialize on production, service and maintenance of specific automotive units and components (such clusters can be found, for instance, in Slovenia and Hungary).

In other words, in the context of modernization and innovative development of small business in the non-resource-based sector, incorporation of small businesses in cluster structures can become a pivotal growth point in the region, providing efficient territorial capitalization.

Models of incorporation of small business in the processes of territorial capitalization

It has been proven both theoretically and practically that the level of capitalization of the territorial potential is to a great extent determined by the form of interaction between local companies. Therefore, it is particularly important to choose the optimal form of cluster interaction: each form has its own advantages, downsides and limitations for small and large business. This choice is also determined by the regional and industry-specific priorities and by the need to achieve the right balance of interests in a newly established structure.

In practice, there are two models of cluster integration: vertical and horizontal. **Vertical integration** of industrial enterprises is based on the relationships of subcontracting and outsourcing (see Figure 1). This type of integration is fairly common in the practice of small business: for example, in Rostov region, agricultural processing enterprises (manufacturers, farms and retailers) united to create one logistics chain to compete with large network companies. Many economists believe that vertical integration of small and large enterprises is one of the most effective forms of interaction since it allows large businesses to focus on mass production and small businesses on innovative R&D.

Horizontal integration of enterprises means that they create one technological chain to manufacture products with higher value added (see Figure 2). This stimulates constant innovation of the enterprises engaged in one technological cycle and thus creates a sustainable network for diffusion of new technologies. This scheme is widely used in international practice: for example, in Italy it underlies the work of footwear manufacturing clusters in which small enterprises cut leather, create designs, produce separate elements of shoes, and so on.

² Source: official web-site of 'MSP Leasing'. Retrieved from http://www.mspleasing.ru/company/press_center/MSP-Lizing-finansiruet-modernizatsiyu-proizvodstva-avtokomponentov-v-industrialnom-klastere-Kaluzhskoy-oblasti-publication

³ Source: official web-site of the regional leasing company 'XXI Vek'. Retrieved from <http://www.xxi-leasing.ru/>

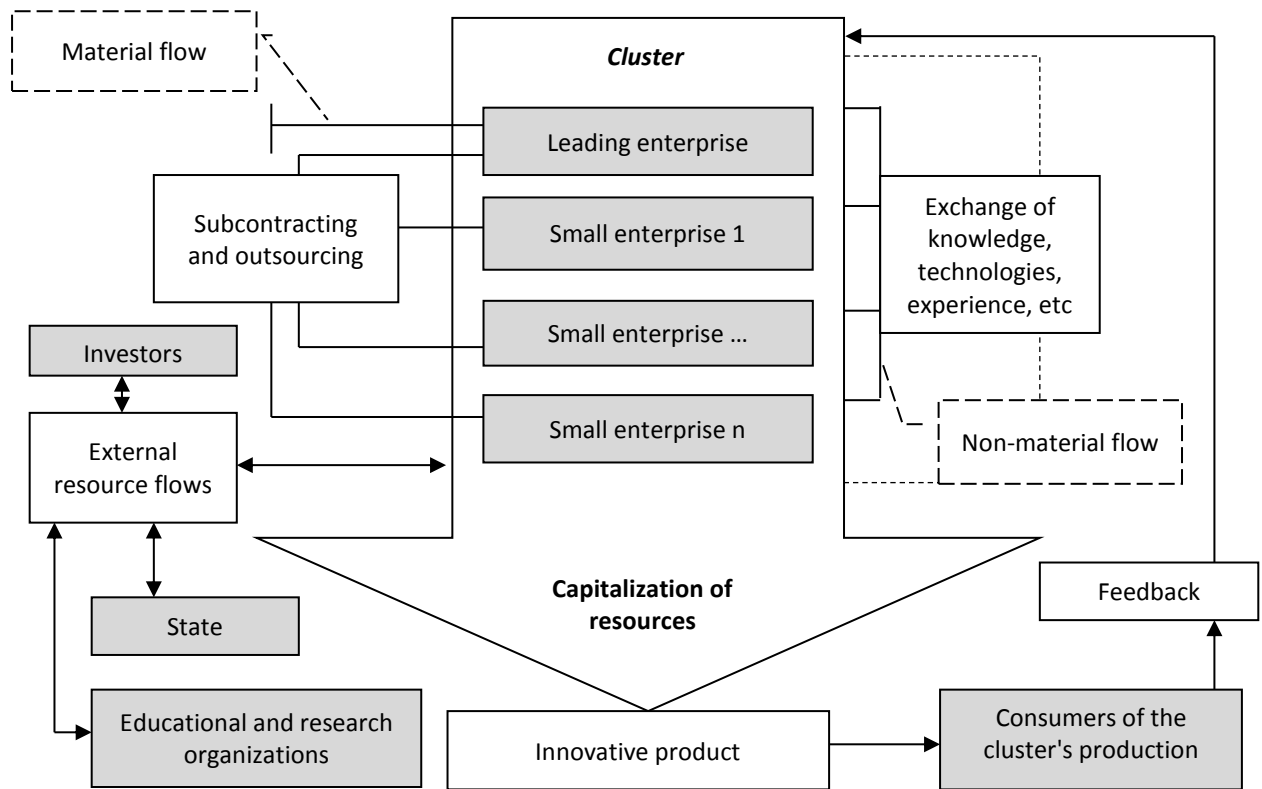


Fig. 1. Capitalization of resource flows in a vertical integration model

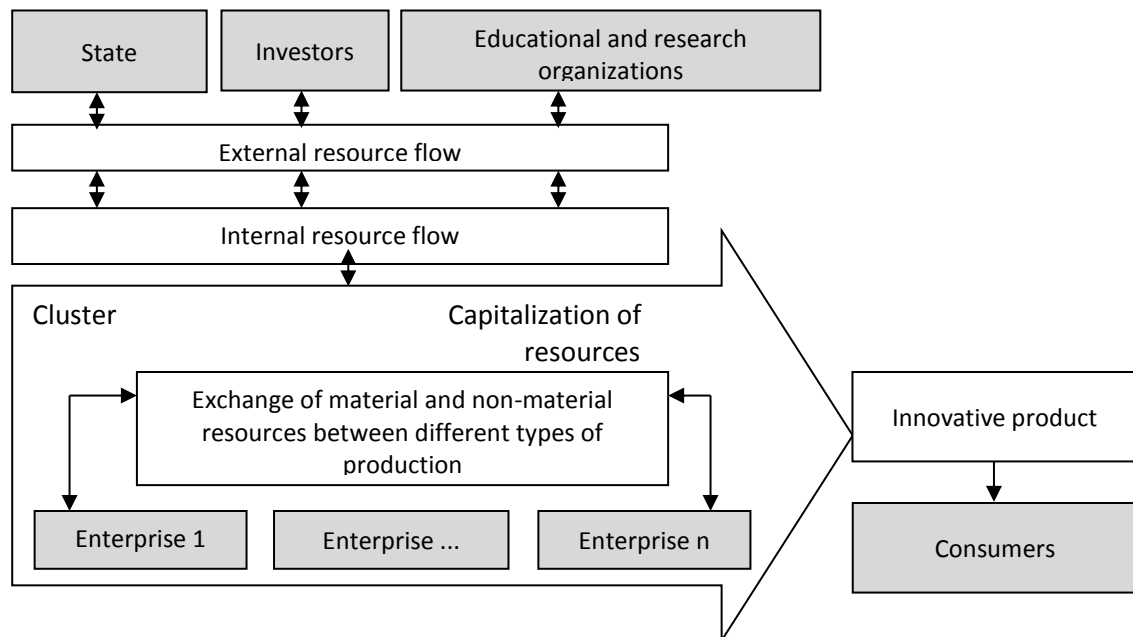


Fig. 2. Capitalization of resource flows in a horizontal integration model

Apart from industrial enterprises, clusters may include financial institutions, which enhance the cluster's investment potential, educational and scientific institutions, which are responsible for innovative R&D, and governmental agencies. According to A.V.Ivanov, engagement of additional agents of interaction (including infrastructural ones) allows clusters to gain extra resources and add these resources to their assets, which is beneficial for individual cluster members as well as for the whole cluster [10].

Significant opportunities for development of small innovative industrial firms are gained by clusters which have a large university as the structural core. The university thus serves as an R&D hub for development and realization of innovative ideas and creation of technologies and products that may interest large industrial companies. The university turns into an institutional platform for development of a successful

partnership between the academic community and business. As international practice has shown (for example, Ghent University in East Flanders, Belgium), students can create their own small innovative enterprises on the basis of their institutes.

Such cluster structures bring a number of advantages to their members:

- enhancement of the status and image of cluster members;
- providing small enterprises with more opportunities for collaborative networking;
- commercialization of the university-based R&D;
- more employment opportunities for university graduates in the innovative sector;
- stimulating innovation [11].

Furthermore, regional economies benefit from developing clusters, because in clusters a variety of resources are concentrated, namely, material, technical, informational, scientific, human etc. These and other resources such as legal and expert services ensure the greater quality of innovation and investment infrastructure and thus enable regional businesses to cut their transaction costs.

The scheme will become complete if we enhance the financial component of the infrastructure in question by employing a target capital fund and involving resources of large business into the financial flows [12, 13]. The Southern Federal University, for example, might become the core of a major cluster for the Southern Federal District since it offers a great variety of educational programs oriented towards innovative development of the national industry.

The conceptual model of such cluster interaction is shown in Figure 3.

As experience in certain industries (oil and gas, transport, electrical power engineering and others) has shown, public-private partnership is essential for developing institutional basis for integration of small and large businesses within an industrial cluster.

Apparently, it is the direct participation of governmental agencies regulating the administrative and legal aspects of business environment that creates favourable institutional conditions for clusters and development of investment climate.

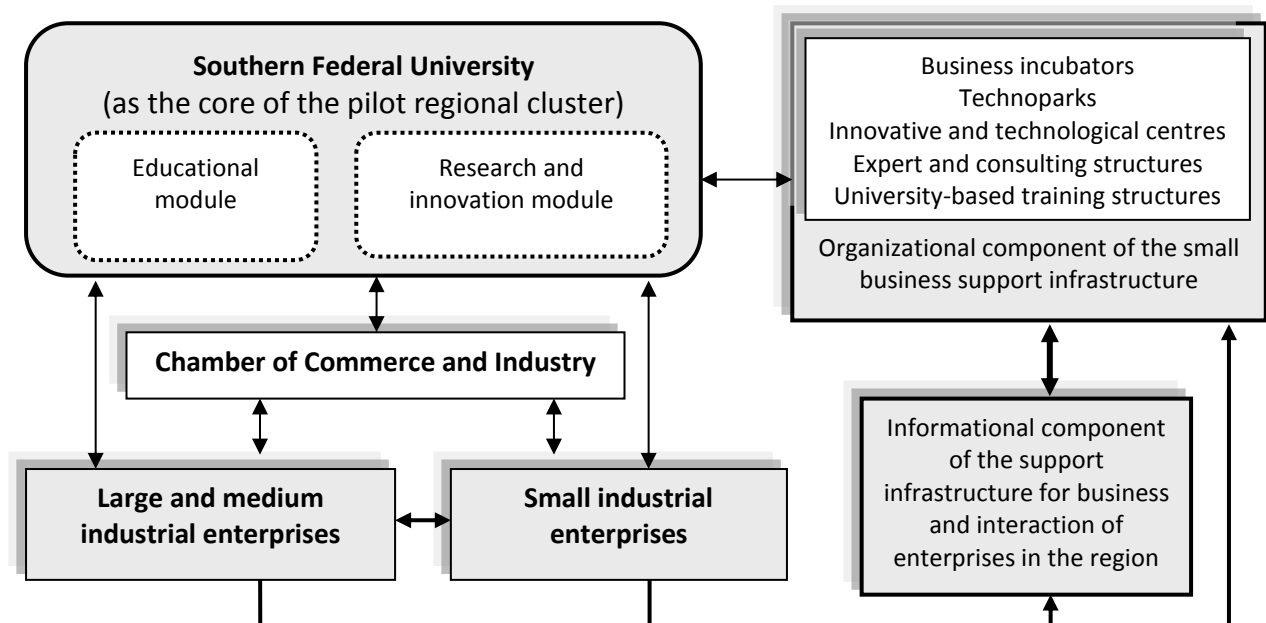


Fig. 3. *Conceptual model of business-state cooperation within a regional cluster [14]*

Tools and methods for assessing the efficiency of small business incorporation into territorial capitalization

We propose to assess the efficiency of small business incorporation into clusters by focusing on territorial capitalization. As the research has shown, although there is a wide range of approaches to this problem, most of them do not focus on territorial capitalization and thus fail to reveal any positive or negative sides of cluster development for the regional industry.

Our research tools are based on an optimized mathematical model [15] used for economic analysis. This model allows us to take into consideration factors of internal and external environment of an enterprise in a cluster. Thus, our calculations will enable us to assess not only the feasibility but also the efficiency of cluster organization of industrial production in the region from different points of view - individual cluster members, cluster structure, and the region in general. In particular, we can quantitatively assess cluster efficiency by considering the following aspects:

- priorities of social and economic systems of higher levels (in relation to the cluster) such as the industry and the region, whose structure will incorporate the cluster;
- presence of large industrial enterprises in the region which could serve as the cluster core;
- strategic and current goals of the modelled cluster structure, its external connections with counteragents and related enterprises in the sphere of innovation and production;
- resources and objectives of potential cluster members (industrial enterprises as well as financial, research, insurance, and other organizations) and their interest in joining the cluster;
- development of institutional, infrastructural, and informational environment for clusterization in the region.

In general, the model to determine the effect of vertical integration of enterprises into a cluster structure is as follows. We consider the possibility of incorporating n ($i=1, \dots, n$) industrial enterprises into a cluster. Each enterprise manufactures two types of production, employing n ($j=1, \dots, n$) kinds of resources.

The original output per each enterprise can be described by the corresponding production function, which reflects the correlation between the output and the production costs:

$$q_i = f_i(x_i^j) \quad (1)$$

where x_i^j is the amount of resource j used to manufacture one product unit of type i ;

q_i is the output of the enterprise that manufactures production i and is a member of the cluster.

Market prices for the production of the enterprises and the cost of one resource unit employed in the production process are expressed through vectors $P = (p_1, p_2, \dots, p_n)$ and $W = (w^1, w^2, \dots, w^n)$ respectively.

The market price of the output of a unit of i product will be designated as P_i , and the cost of one resource unit j , as w^j .

Then, the revenue of the enterprise making production i can be denoted as $p_i q_i$, while its costs as $\sum_{j=1}^n w^j x_i^j$.

Therefore, the revenue of this enterprise will be as follows:

$$\pi_i = p_i q_i - \sum_{j=1}^n w^j x_i^j \quad (2)$$

The revenue of the whole industrial cluster, consisting of n enterprises, will be calculated according to the following formula:

$$\pi_i = \sum_{i=1}^n p_i q_i - \sum_{i=1}^n \sum_{j=1}^n w^j x_i^j \quad (3)$$

Supposing the enterprises in question have decided to create a cluster structure and have chosen the horizontal type of integration, then it will be impractical for them to inflate the prices for their production, since the production of one cluster member is a resource for another and all members are interested in enhancing the cluster's overall revenues. Therefore, inside the cluster, enterprises will be using below-market prices (or the so-called internal or transfer prices). These internal prices for production (and, therefore, resources) can be presented as the vector of internal prices for production and the vector of resource costs for production: $P^0 = (p_1^0, p_2^0, \dots, p_n^0)$ and $W^0 = (w^{01}, w^{02}, \dots, w^{0n})$, which are set by cluster members.

It is obvious that in order to make it profitable for companies to join clusters it is necessary that the revenue of an industrial cluster should exceed the revenue of each company when working independently. In this case the expression to describe the gain in efficiency resulting from joining the cluster is as follows:

$$\pi_{III} = \left[\sum_{i=1}^k p_i^0 q_i + \sum_{i=k+1}^n p_i^0 q_i \right] - \left[\sum_{i=1}^n \sum_{j=1}^k w^{0j} x_i^j + \sum_{i=1}^n \sum_{j=k+1}^n w^{0j} x_i^j \right] \rightarrow \max$$

$$q_i = f_i(x_i^j)$$

$$\frac{\sum_{i=1}^n p_i q_i - \sum_{i=1}^n \sum_{j=1}^n w^j x_i^j}{\sum_{i=1}^n p_i^0 q_i - \sum_{i=1}^n \sum_{j=1}^n w^{0j} x_i^j} < 1$$

$$x_i^j \geq 0, i = \overline{1, n}, j = \overline{1, n} \quad (4)$$

To test this model let us assess the efficiency of a hypothetical cluster. The input data are presented in Table 1.

Table 1.

Potential cluster members

Enterprise 1		Enterprise 2		Enterprise 3	
$X_1 = \begin{pmatrix} 200 & 110 \\ 500 & 170 \end{pmatrix}$		$X_2 = \begin{pmatrix} 150 & 80 \\ 300 & 120 \end{pmatrix}$		$X_3 = \begin{pmatrix} 160 & 90 \\ 310 & 130 \end{pmatrix}$	
$q_1 = 8000$ tons		$q_2 = 4000$ tons		$q_3 = 4500$ tons	
Production type 1	Production type 2	Production type 1	Production type 2	Production type 1	Production type 2
7000 tons	1000 tons	3000 tons	1000 tons	3000 tons	1500 tons
$p_1 = 100$ MU	$p_2 = 100$ MU	$p_1 = 100$ MU	$p_2 = 100$ MU	$p_1 = 100$ MU	$p_2 = 100$ MU
$w^1 = 50$ MU	$w^2 = 90$ MU	$w^1 = 50$ MU	$w^2 = 90$ MU	$w^1 = 50$ MU	$w^2 = 90$ MU

The calculation results are as follows:

$$\pi_{III} = \left[\sum_{i=1}^k p_i^0 q_i + \sum_{i=k+1}^n p_i^0 q_i \right] - \left[\sum_{i=1}^n \sum_{j=1}^k w^{0j} x_i^j + \sum_{i=1}^n \sum_{j=k+1}^n w^{0j} x_i^j \right] = 1617000 - 14660 = 1602340 \text{ d.e.}$$

If these enterprises operate separately, their total revenue will be 1,506,000 monetary units.

Thus, the following conditions are met:

$$\pi_{III} = 1602340 \text{ d.e.} > \pi = 1506000 \text{ d.e.}$$

$$\frac{\sum_{i=1}^n p_i q_i - \sum_{i=1}^n \sum_{j=1}^n w^j x_i^j}{\sum_{i=1}^n p_i^0 q_i - \sum_{i=1}^n \sum_{j=1}^n w^{0j} x_i^j} = \frac{1506000 \text{ d.e.}}{1602340 \text{ d.e.}} = 0,94 < 1,$$

which proves that it is profitable for these enterprises to join the cluster.

Managerial decision-making can be improved through modelling of the key indicators of the company's efficiency when incorporated in a cluster and when operating independently, especially when the company management are considering the share of production to be sold on the external market or to be used in the cluster's technological chain. Eventually, the use of this tool will contribute to the cluster's competitiveness and secure the cluster a better market position.

The above-described tools are universal and can be applied for modelling cluster structures consisting of any number of small and medium enterprises in different industries.

Conclusion

Russian business operates in the highly dynamic external environment, with increasingly demanding consumers and fierce competition, which makes it particularly important to provide small industrial enterprises with an innovative edge. We believe that integration of businesses into clusters is as an innovative form of production, which will positively affect the territorial capitalization.

In other words, incorporation of small businesses into cluster structures, on the one hand, provides an effective tool for integrated and innovative development of the region and, on the other hand, will be beneficial for large and small enterprises enabling them to address the challenges of the market. The strategies for development of industrial clusters involving small businesses should be consistent with the general strategies of social and economic development of regions. Regional industrial clusters are crucial for the development of modern entrepreneurship – small, medium, and large. Clusterization requires integration of the territory into the global economic space. Groups of industries can successfully interact within clusters, contributing to the multiplier effect on employment and technology transfer in the regional economy. It is also recommended that the cluster should include small enterprises operating in the periphery, which will ensure a more spatially balanced pattern of industrial growth in the region.

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